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Orogeny forced terrestrial climate variation during the late Eocene–early Oligocene in Europe

L. Kocsis*, P. Ozsvárt, D. Becker, R. Ziegler, L. Scherler and V. Codrea

Table DR1. Background information on the sampled localities (1 page)

Table DR2. The analyzed samples and their isotopic compositions (3 pages)

Preparation of the samples for stable isotope analyses

Fig. DR1. Phosphate and structural carbonate oxygen isotopic compositions in biogenic apatite

Table DR3. Statistical comparison of different taxa from the four most representative localities

Fig. DR2. Detailed paleogeographic maps with tectonic units

References

TABLE DR1

MAMMAL LEVEL	Map-Nr.	Locality	Country	Environment	Literature	Collections (specimens)
MP15+	**1**	Csordakút	Hungary	marine - NP16 - Csolnok Claymarl Formation	Báldi-Beke, 1984; Ozsvárt, 1999; Kocsis, 2002	MTM (1)
MP16	**2**	Mormont-Station d'Eclépens	Switzerland	karst fissure fillings	Hooker & Weidmann, 2000	MGL (8)
MP16	**3**	St. Mamert du Gard	France	continental - stratified	Depéret & Carrière, 1901; Aguilar et al, 1997;	MTM (5)
MP17a	**4**	Euzet-les-Bains	France	continental - stratified	Aguilar et al, 1997; Paelobiology database - www.paleodb.org	MTM (5), NMB(5)
MP18	**5**	La Débruge	France	mire or swamp - black sandy marl	Aguilar et al, 1997; Paelobiology database - www.paleodb.org	NMB (3)
MP18	**6**	Gösgen-Canal	Switzerland	continental	Aguilar et al, 1997; Paelobiology database - www.paleodb.org	NMB (2)
MP18	**7**	Rădaia (Andrásháza)	Romania	continental - Valea Nadăşului Formation	Fărcaş and Codrea, 2008	MAFI (1)
?MP18-19	**8**	Budapest - MTM collection	Hungary	???	Kretzoi, 1940	MTM (1)
MP19	**2**	Mormont-Eclépens C	Switzerland	karst fissure fillings	Hooker & Weidmann, 2000	MGL (2), NMB (2)
MP19	**9**	Liptingen 5	Germany	karst fissure fillings	Scherzinger et al., 2005	SMNS (4)
MP19	**9**	Liptingen 13A	Germany	karst fissure fillings	Scherzinger et al., 2005	SMNS (3)
MP19	**10**	Neuhausen, Württemberg	Germany	karst fissure fillings	Scherzinger et al., 2005	SMNS (3)
MP19	**11**	Mähringen	Germany	karst fissure fillings	Scherzinger et al., 2005	SMNS (4)
MP20	**12**	Frohnstetten	Germany	karst fissure fillings	Scherzinger et al., 2005	SMNS (6)
MP21-	**13**	Monteviale	Italy	continental - lignite deposit	Dal Piaz G.B., 1930, 1931; Tuchtan, 1953; Uhlig, 1999; Becker, 2009	PGM (16)
MP21	**14**	Ronzon	France	continental - lime mudstone - Phospherites du Quercy	Aguilar et al, 1997; Paelobiology database - www.paleodb.org	NMB (3)
MP21	**15**	Möhren 19	Germany	karst fissure fillings	Uhlig, 1999	BSGP (11)
MP21-22	**16**	Cluj	Romania	marine - NP22-23 - Mera Formation	Filipescu, 2001; Fărcaş and Codrea, 2008; Fărcaş, 2011	MTM (1)
MP22	**17**	Villebramar	France	continental - gravelly sand deposit	Brunet, 1970, 1979; Aguilar et al, 1997; Scherler, 2011	NMB (14)
MP22	**18**	Kleinblauen	Switzerland	marine - NP22 - Meeressand	Becker, 2009; Scherler, 2011	NMB (1)
MP22	**15**	Möhren13	Germany	karst fissure fillings	Uhlig, 1999	BSGP (15)
MP23+	**19**	Budapest - Bohn clay pit	Hungary	marine - NP23 - top of the Tard Clay Formation	Kretzoi, 1940; Bádli-Beke, 1984; Báldi & Báldi-Beke, 1985	MTM (1)
MP23-24	**19**	Budapest - Ujlak clay pit	Hungary	marine - NP24 - Kiscell Clay Formation	Kretzoi, 1940; Bádli-Beke, 1984; Báldi & Báldi-Beke, 1985	MTM (2)
MP23-24	**16**	Cluj	Romania	continental - coal bearing depoits - Dâncu Formation	Fărcaş and Codrea, 2008	UBB (2)
MP23-24	**20**	Aghires	Romania	continental - coal bearing depoits - Dâncu Formation	Fărcaş and Codrea, 2008	UBB (1)
MP23-25	**21**	Csákberény	Hungary	continental - clay deposit -	Kretzoi, 1940	MTM (2)
MP24-	**22**	Poillat	Switzerland	continental - Molasse alsacienne	Scherler, 2011; Becker et al., 2013	MJSN (4)
MP24-25	**23**	Tatabánya - Felsőgalla	Hungary	continental - coal bearing depoits - ?Csatka Formation	Kordos, 1978; Becker and Scherler (this study)	MTM (4)
MP25-	**24**	Bumbach	Switzerland	continental - Sub-alpine Molasse	Engesser and Mödden, 1997; Scherler, 2011; Scherler et al., in press	NMB (3)

BSPG - Bayerische Staatssammlung für Paläontologie und Geologie (Bavarian State Collection for Palaeontology and Geology, Munich, Bavaria, Germany)
MAFI - Magyar Földtani Intezet (Collection of the Hungarian Geological Institute, Budapest, Hungary)
MGL - Musée géologique de Lausanne (Geological Museum, Lausanne, Switzerland)
MGP - Museo di Geologia e Paleontologia (Museum of Geology and Palaeontology Padua, Italy)
MJSN - Musée Jurassien des Sciences Naturelles (Jura Natural Science Museum, Porrentury, Switzerland)
MTM - Magyar Természettudományi Muzeum (Hungarian Natural History Museum, Budapest, Hungary)
NMB - Naturhistorisches Museum Basel (Natural History Museum, Basel, Switzerland)
SMNS - Staatlichen Museum für Naturkunde Stuttgart (State Museum for Natural History, Stuttgart, Germany)
UBB - Fossil Collection of the University of Babes-Bolyai, Cluj, Romania

TABLE DR2

Map-Nr.	Locality		Collection & Nr.	Taxon	Sampled material	Family	MAMMAL LEVEL	Age (Ma)	PHOSPHATE δ^{18}O-PO4 SMOW	std.*	AV.	STD.**	N	1.96×SE	CARBONATE IN PHOSPHATE δ^{13}C	std.	AV.	STD.	N	1.96×SE	$\delta^{13}C_{diet}$	δ^{18}O-CO3 VPDB	δ^{18}O-CO3 VSMOW	std.	CO3 wt.%
1	Csordakút	HU	MTM-V.2002.12	*Hyrachyus* cf. *stehlini*	left M1/2	P - Hyrachyidae	MP15+	40.8	21.0	0.2	21.0	0.3	1	0.6	-9.2	0.2	-9.2	0.1	1	0.2	-22.9	-4.2	26.6	0.1	5.0
2	Mormont - Station d'Eclépens	CH	MGL-2259	*Palaeotherium curtum*	left m3	P - Palaeotheriidae	MP16	39	21.7	0.1					-7.6	0.0						-3.1	27.7	0.0	5.3
2	Mormont - Station d'Eclépens	CH	MGL-2260	*Palaeotherium curtum*	right m2	P - Palaeotheriidae	MP16	39	19.2	0.1															
2	Mormont - Eclépens A	CH	MGL-2391	*Plagiolophus* sp. 1	left M3	P - Pachynolophidae	MP16	39	22.3	0.2					-7.0	0.1						-2.9	27.9	0.1	3.6
2	Mormont	CH	MGL-2391	*Leptolophus stehlini*	right M3	P - Palaeotheriidae	MP16	39	21.0	0.2					-7.0	0.0						-4.3	26.5	0.1	5.4
2	Mormont - Station d'Eclépens	CH	MGL-1620	*Lophiodon lautricense*	right P3	P - Lophiodontidae	MP16	39	21.3	0.0					-8.2	0.1						-3.7	27.1	0.1	4.9
2	Mormont - Station d'Eclépens	CH	MGL-1623	*Lophiodon lautricense*	left m2	P - Lophiodontidae	MP16	39	21.5	0.2					-8.7	0.1						-4.5	26.3	0.1	1.9
2	Mormont - Station d'Eclépens	CH	MGL-1627	*Lophiodon tapiroides*	right p2	P - Lophiodontidae	MP16	39	21.4	0.3					-8.5	0.1						-5.2	25.6	0.1	2.2
2	Mormont - Station d'Eclépens	CH	MGL-1628	*Lophiodon tapiroides*	right M2 (M1?)	P - Lophiodontidae	MP16	39	21.2	0.2	21.2	0.9	8	0.6	-8.7	0.1	-8.0	0.7	7	0.5	-21.8	-4.8	25.9	0.1	1.8
3	St. Mamert du Gard	FR	MTM-V.60.152	*Lophiodon franconica*	left M3	P - Lophiodontidae	MP16	38.85	21.6	0.1															
3	St. Mamert du Gard	FR	MTM-V.60.153	*Lophiodon franconica*	right M2/3	P - Lophiodontidae	MP16	38.85	21.1	0.0					-9.2	0.1						-6.2	24.5	0.2	2.4
3	St. Mamert du Gard	FR	MTM-V.60.151	*Lophiodon franconica*	tooth frg. m1(m2?)	P - Lophiodontidae	MP16	38.85	21.8	0.1															
3	St. Mamert du Gard	FR	MTM-V.60.187	*Lophiodon franconica*	left m1?	P - Lophiodontidae	MP16	38.85	21.6	0.2	21.5	0.3	4	0.3			-9.2	0.1	1	0.2	-23.0				
4	Euzet les Bains	FR	NMB-no number	*Plagiolophus* sp. (*annectens* ?)	left M2	P - Pachynolophidae	MP17a	37.5	20.3	0.1					-7.0	0.0						-6.6	24.1	0.0	5.9
4	Euzet les Bains	FR	NMB-no number	*Plagiolophus* sp. (*annectens* ?)	left M3	P - Pachynolophidae	MP17a	37.5	22.6	0.2					-7.3	0.0						-4.7	26.1	0.1	6.5
4	Euzet les Bains	FR	NMB-no number	*Plagiolophus* sp. (*annectens* ?)	M	P - Pachynolophidae	MP17a	37.5	19.9	0.2					-7.8	0.1						-3.9	26.8	0.1	3.9
4	Euzet les Bains	FR	NMB-no number	*Plagiolophus* sp. (*annectens* ?)	M	P - Pachynolophidae	MP17a	37.5	22.0	0.1					-9.1	0.1						-3.3	27.5	0.1	3.5
4	Euzet les Bains	FR	NMB-no number	*Plagiolophus* sp. (*annectens* ?)	m	P - Pachynolophidae	MP17a	37.5	19.7	0.1					-8.7	0.1						-6.3	24.4	0.0	6.3
4	Euzet les Bains	FR	MTM-V.60.84	*Lophiotherium cervulum*	left m2	P - Lophiodontidae	MP17a	37.5	19.6	0.2					-7.8	0.1						-4.4	26.3	0.1	4.2
4	Euzet les Bains	FR	MTM-V.60.1317	*Palaeotherium crassum*	left P4	P - Palaeotheriidae	MP17a	37.5	20.5	0.3															
4	Euzet les Bains	FR	MTM-V.60.82	*Anchilophus dumasi*	right M3	P - Palaeotheriidae	MP17a	37.5	21.4	0.1															
4	Euzet les Bains	FR	MTM-V.60.1319	*Paloplotherium annectens*	right M	P - Pachynolophidae	MP17a	37.5	19.6	0.2															
4	Euzet les Bains	FR	MTM-V.60.1335	*Palaeotherium crassum*	right M2(M3?)	P - Palaeotheriidae	MP17a	37.5	20.0	0.0	20.6	1.1	10	0.7			-8.0	0.8	6	0.7	-21.7				
5	La Débruge	FR	NMB-DB.10	*Palaeotherium magnum*	M	P - Palaeotheriidae	MP18	36	22.5	0.1					-8.9	0.1						-2.8	28.0	0.1	4.0
5	La Débruge	FR	NMB-DB.29	*Palaeotherium magnum*	I/i	P - Palaeotheriidae	MP18	36	22.0	0.2															
5	La Débruge	FR	NMB-DB.156	*Anoplotherium* sp.	M	A - Anoplotheriidae	MP18	36	21.2	0.2	21.9	0.7	3	0.7	-10.9	0.1	-9.9	1.4	2	2.0	-23.6	-2.9	27.9	0.1	4.1
6	Gösgen-Canal	CH	NMB-G.C.6	*Palaeotherium curtum*	M1	P - Palaeotheriidae	MP18	36	19.6	0.2															
6	Gösgen-Canal	CH	NMB-G.C.637	*Palaeotherium curtum*	I/i	P - Palaeotheriidae	MP18	36	19.0	0.1	19.3	0.5	2	0.7											
7	Radaia (Andrásháza)	RO	MAFI-Ob58- Vt71	*Brachydiastematherium transsylvanicum*	left m4 (m3?)	P - Brontotheriidae	MP18	36	19.2	0.0	19.2	0.3	1	0.6	-9.8	0.1	-9.8	0.1	1	0.2	-23.6	-5.3	25.4	0.1	5.6
8	"Budapest"	HU	MTM-V.60.149	*Amynodon hungaricus*	right m2/3	P - Amynodontidae	?MP18-19	35	18.4	0.2	18.4	0.3	1	0.6	-8.7	0.1	-8.7	0.1	1	0.2	-22.5	-5.4	25.3	0.1	5.8
2	Mormont - Entreroches	CH	NMB - no number	Palaeotheriidae indet.	tooth frg.	P - Palaeotheriidae	MP19	34.5	19.7	0.1					-9.5	0.1						-6.0	24.7	0.2	3.2
2	Mormont - Entreroches	CH	NMB - no number	Palaeotheriidae indet.	tooth frg.	P - Palaeotheriidae	MP19	34.5	20.5	0.2					-9.5	0.1						-4.1	26.6	0.1	4.5
2	Mormont - Entreroches	CH	MGL-46784	*Anoplotherium* sp.	right P4	A - Anoplotheriidae	MP19	34.5	20.6	0.1					-9.1	0.0						-5.0	25.8	0.1	4.5
2	Mormont - Eclépens C	CH	MGL-47275	*Palaeotherium crassum renevieri*	left M1/2	P - Palaeotheriidae	MP19	34.5	21.2	0.1	20.5	0.6	4	0.6			-9.4	0.2	3	0.2	-23.2				
9	Liptingen 5	GE	SMNS-no number	*Anoplotherium pompeckii*	right p4	A - Anoplotheriidae	MP19	34.5	17.0	0.0					-9.6	0.1						-8.8	21.9	0.1	3.3
9	Liptingen 5	GE	SMNS-no number	*Palaeotherium curtum*	left P1	P - Palaeotheriidae	MP19	34.5	18.1	0.1															
9	Liptingen 5	GE	SMNS-no number	?*Anoplotherium* sp.	?I/i3	A - Anoplotheriidae	MP19	34.5	20.0	0.1															
9	Liptingen 5	GE	SMNS-no number	?*Palaeotherium* sp.	M3/2, frg.	P - Palaeotheriidae	MP19	34.5	17.4	0.1	18.1	1.3	4	1.3											
9	Liptingen 13A	GE	SMNS-no number	*Diplobune secundaria*	M3	A - Anoplotheriidae	MP19	34.5	19.8	0.1															
9	Liptingen 13A	GE	SMNS-no number	*Anoplotherium* sp.	M?, frg.	A - Anoplotheriidae	MP19	34.5	18.8	0.3	19.3	0.7	2	1.0											
10	Neuhausen, Württemberg	GE	MTM-V.60.299	*Palaeotherium minus*	M1	P - Palaeotheriidae	MP19	34.5	18.3	0.1					-10.5	0.0						-5.5	25.2	0.1	6.6
10	Neuhausen, Württemberg	GE	SMNS-4028	*Palaeotherium magnum*	right M3	P - Palaeotheriidae	MP19	34.5	19.5	0.1					-10.9	0.1						-6.5	24.2	0.1	3.7
10	Neuhausen, Württemberg	GE	SMNS-1586	*Palaeotherium muehlbergi*	left p4	P - Palaeotheriidae	MP19	34.5	18.4	0.3	18.7	0.7	3	0.7	-9.9	0.1						-6.5	24.2	0.1	4.3
11	Mähringen	GE	SMNS-no number	*Anoplotherium pompeckii*	M3	A - Anoplotheriidae	MP19	34.5	18.7	0.2					-9.9	0.1						-7.5	23.2	0.1	3.3
11	Mähringen	GE	SMNS-1448	*Palaeotherium duvali duvali*	left M1	P - Palaeotheriidae	MP19	34.5	18.5	0.2					-10.9	0.1						-6.9	23.8	0.1	4.0
11	Mähringen	GE	SMNS-no number	*Diplobune secundaria*	left M3	A - Anoplotheriidae	MP19	34.5	19.1	0.3					-8.4	0.0						-5.8	24.9	0.0	6.4
11	Mähringen	GE	SMNS-no number	*Diplobune quercyi*	right M2	A - Anoplotheriidae	MP19	34.5	18.4	0.1	18.7	0.3	4	0.3											
								34.5			18.6	0.9	13	0.5			-10.0	0.9	7	0.7	-23.8				
								34.5																	
12	Frohnstetten	GE	SMNS-1908	*Palaeotherium curtum frohnstettense*	left M3	P - Palaeotheriidae	MP20	33.8	17.5	0.2					-12.1	0.1						-6.0	24.7	0.1	5.1
12	Frohnstetten	GE	SMNS-2534	*Palaeotherium medium suenicum*	right P4	P - Palaeotheriidae	MP20	33.8	17.1	0.2					-11.7	0.1						-7.2	23.5	0.1	3.3
12	Frohnstetten	GE	SMNS-3384	*Plagiolophus fraasi*	M3	P - Pachynolophidae	MP20	33.8	16.8	0.3					-11.3	0.0						-7.7	22.9	0.1	4.6
12	Frohnstetten	GE	SMNS-2852	*Plagiolophus minor*	right M3	P - Pachynolophidae	MP20	33.8	16.7	0.2					-11.1	0.1						-8.5	22.2	0.1	5.0
12	Frohnstetten	GE	SMNS-no number	*Anoplotherium pompeckii*	M3	A - Anoplotheriidae	MP20	33.8	17.2	0.1	17.0	0.3	5	0.3			-11.5	0.4	4	0.4	-25.3				

TABLE DR2

Map-Nr.	Locality		Collection & Nr.	Taxon	Sampled material	Family	MAMMAL LEVEL	Age (Ma)	PHOSPHATE δ^{18}O-PO4 SMOW	std.*	AV.	STD.**	N	1.96×SE	CARBONATE IN PHOSPHATE δ^{13}C	std.	AV.	STD.	N	1.96×SE	$\delta^{13}C_{diet}$	δ^{18}O-CO3 VPDB	δ^{18}O-CO3 VSMOW	std.	CO3 wt.%
13	Monteviale	IT	MGP-31410	*Anthracotherium monsvialense*	left M3	A - Anthracotheriidae	MP21-	33.4	20.0	0.1					-9.8	0.1						-3.9	26.9	0.1	3.7
13	Monteviale	IT	MGP-31411	*Anthracotherium monsvialense*	right M1	A - Anthracotheriidae	MP21-	33.4	20.8	0.2					-8.5	0.1						-3.1	27.7	0.1	4.3
13	Monteviale	IT	MGP-31412	*Anthracotherium monsvialense*	right m2	A - Anthracotheriidae	MP21-	33.4	21.7	0.1					-8.3	0.1						-3.1	27.8	0.1	3.4
13	Monteviale	IT	MGP-31412	*Anthracotherium monsvialense*	right m1	A - Anthracotheriidae	MP21-	33.4	21.2	0.1															
13	Monteviale	IT	MGP-31413	*Anthracotherium monsvialense*	right M2	A - Anthracotheriidae	MP21-	33.4	22.2	0.1					-7.7	0.0						-2.0	28.8	0.0	6.7
13	Monteviale	IT	MGP-31414	*Anthracotherium monsvialense*	right m3	A - Anthracotheriidae	MP21-	33.4	20.2	0.1					-9.3	0.1						-4.4	26.3	0.1	3.0
13	Monteviale	IT	MGP-31415	*Anthracotherium monsvialense*	left i3	A - Anthracotheriidae	MP21-	33.4	20.3	0.3					-8.2	0.0						-3.4	27.4	0.1	6.5
13	Monteviale	IT	MGP-27295	*Epiaceratherium bolcense* (*Trigonias ombonii*)	left M3	P - Rhinocerotidae	MP21-	33.4	21.0	0.2					-9.0	0.0						-3.5	27.3	0.1	3.3
13	Monteviale	IT	MGP-28009	*Epiaceratherium bolcense* (*Trigonias ombonii*)	left M2	P - Rhinocerotidae	MP21-	33.4	20.5	0.0					-9.1	0.1						-3.6	27.2	0.1	3.2
13	Monteviale	IT	MGP-27297	*Epiaceratherium bolcense* (*Trigonias ombonii*)	left m3	P - Rhinocerotidae	MP21-	33.4	21.2	0.2					-8.9	0.1						-3.2	27.6	0.1	2.8
13	Monteviale	IT	MGP-27292	*Epiaceratherium bolcense* (*Trigonias ombonii*)	left M1 (?P4)	P - Rhinocerotidae	MP21-	33.4	20.3	0.2					-9.8	0.1						-3.9	26.9	0.1	3.1
13	Monteviale	IT	MGP-27298	*Epiaceratherium bolcense* (*Trigonias ombonii*)	left p2	P - Rhinocerotidae	MP21-	33.4	22.4	0.2					-9.5	0.1						-3.1	27.8	0.1	3.1
13	Monteviale	IT	MGP-27298	*Epiaceratherium bolcense* (*Trigonias ombonii*)	left m2	P - Rhinocerotidae	MP21-	33.4	22.8	0.3					-9.8	0.1						-2.4	28.4	0.1	3.7
13	Monteviale	IT	MGP-27349	*Anthracochoerus stehlini*	left m2	A - Anthracotheriidae	MP21-	33.4	20.0	0.2															
13	Monteviale	IT	MGP-27349	*Anthracochoerus stehlini*	left m2	A - Anthracotheriidae	MP21-	33.4	20.1	0.1															
13	Monteviale	IT	MGP-27353	*Anthracochoerus stehlini*	right m3	A - Anthracotheriidae	MP21-	33.4	20.7	0.3	21.0	0.9	16	0.5			-9.0	0.7	12	0.4	-22.8				
14	Ronzon	FR	NMB-no number	*Bothriodon* sp.	P	A - Anthracotheriidae	MP21	33.25	19.8	0.2					-8.0	0.1						-4.78	26.0	0.1	5.2
14	Ronzon	FR	NMB-no number	*Bothriodon* sp.	P	A - Anthracotheriidae	MP21	33.25	20.8	0.2					-8.7	0.1						-4.56	26.2	0.1	5.5
14	Ronzon	FR	NMB-no number	*Bothriodon* sp.	P	A - Anthracotheriidae	MP21	33.25	20.3	0.1	20.3	0.5	3	0.6	-9.0	0.1	-8.6	0.5	3	0.6	-22.4	-4.36	26.4	0.1	5.6
15	Möhren 19	GE	BSPG-1974XXV62	*Diplobune* sp.	m1	A - Anoplotheriidae	MP21	33.25	21.4	0.1					-11.1	0.0						-2.9	27.9	0.1	4.6
15	Möhren 19	GE	BSPG-1974XXV59	*Diplobune* cf. *quercyi*	left m3	A - Anoplotheriidae	MP21	33.25	18.9	0.1															
15	Möhren 19	GE	BSPG-1974XXV61	*Diplobune* cf. *quercyi*	M	A - Anoplotheriidae	MP21	33.25	18.4	0.1					-12.2	0.1						-5.4	25.3	0.1	4.3
15	Möhren 19	GE	BSPG-1974XXVN1	*Diplobune* sp.	enamel frg.	A - Anoplotheriidae	MP21	33.25	20.2	0.3					-10.7	0.0						-4.4	26.4	0.1	4.6
15	Möhren 19	GE	BSPG-1974XXV265	*Palaeotherium medium*	M frg.	P - Palaeotheriidae	MP21	33.25	17.8	0.1					-12.1	0.1						-5.8	24.9	0.1	3.6
15	Möhren 19	GE	BSPG-1974XXV265	*Palaeotherium medium*	M frg.	P - Palaeotheriidae	MP21	33.25	17.7	0.0					-11.4	0.1						-6.1	24.7	0.1	3.4
15	Möhren 19	GE	BSPG-1974XXV265	*Palaeotherium medium*	M frg.	P - Palaeotheriidae	MP21	33.25	18.0	0.1					-11.9	0.1						-5.9	24.9	0.1	4.5
15	Möhren 19	GE	BSPG-1974XXV265	*Palaeotherium medium*	M frg.	P - Palaeotheriidae	MP21	33.25	20.9	0.0					-10.4	0.1						-3.4	27.4	0.2	4.1
15	Möhren 19	GE	BSPG-1974XXV98	*Anoplotherium commune*	right m5	A - Anoplotheriidae	MP21	33.25	18.1	0.1					-14.1	0.1						-6.0	24.7	0.1	3.5
15	Möhren 19	GE	BSPG-1974XXV103	*Anoplotherium commune*	right M	A - Anoplotheriidae	MP21	33.25	17.1	0.1	18.8	1.5	10	0.9	-13.2	0.1	-11.9	1.2	9	0.8	-25.6	-6.2	24.6	0.2	3.8
16	Cluj	RO	MTM-V.69.167	*Ronzotherium kochi* *	left M2 frg.	P - Rhinocerotidae		32	19.9	0.1					-9.8	0.1						-3.7	27.1	0.2	5.6
16	Cluj	RO	MTM-V.69.167	*Ronzotherium kochi* *	left M2 frg.	P - Rhinocerotidae	MP21-22	32	20.2	0.1	20.1	0.3	1	0.6	-10.0	0.1	-9.9	0.1	2	0.2	-23.6	-5.4	25.4	0.1	3.4
17	Villebramar	FR	NMB-Vbr17	*Entelodon* sp.	m	A - Entelodontidae	MP22	31.7	19.4	0.2					-11.2	0.0						-4.8	26.0	0.1	5.6
17	Villebramar	FR	NMB-Vbr102	*Entelodon* sp.	m	A - Entelodontidae	MP22	31.7	18.9	0.3					-10.5	0.1						-5.7	25.0	0.1	4.5
17	Villebramar	FR	NMB-Vbr154	*Entelodon* sp.	P1	A - Entelodontidae	MP22	31.7	23.1	0.2					-10.7	0.1						-1.7	29.2	0.1	5.2
17	Villebramar	FR	NMB-no number	*Ronzotherium* sp.	tooth frg.	P - Rhinocerotidae	MP22	31.7	18.4	0.3					-10.8	0.1						-5.4	25.4	0.1	4.6
17	Villebramar	FR	NMB-Vbr49	*Ronzotherium* sp.	M frg.	P - Rhinocerotidae	MP22	31.7	18.9	0.0					-10.5	0.1						-4.8	25.9	0.1	5.2
17	Villebramar	FR	NMB-Vbr29	*Ronzotherium* sp.	M frg.	P - Rhinocerotidae	MP22	31.7	20.1	0.2					-11.4	0.1						-4.0	26.8	0.0	4.8
17	Villebramar	FR	NMB-Vbr48	*Ronzotherium* sp.	M frg.	P - Rhinocerotidae	MP22	31.7	18.4	0.2					-8.8	0.1						-4.5	26.2	0.1	5.7
17	Villebramar	FR	NMB-Vbr40	*Ronzotherium* sp.	M frg.	P - Rhinocerotidae	MP22	31.7	20.2	0.2					-10.4	0.1						-3.7	27.1	0.1	4.4
17	Villebramar	FR	NMB-Vbr35	*Ronzotherium* sp.	M frg.	P - Rhinocerotidae	MP22	31.7	17.6	0.1					-11.2	0.1						-5.5	25.2	0.1	4.0
17	Villebramar	FR	NMB-no number	*Plagiolophus* sp.	tooth frg.	P - Pachynolophidae	MP22	31.7	21.9	0.2					-10.6	0.1						-2.8	28.0	0.1	4.7
17	Villebramar	FR	NMB-no number	*Plagiolophus* sp.	tooth frg.	P - Pachynolophidae	MP22	31.7	21.5	0.2					-10.0	0.1						-3.2	27.6	0.1	4.3
17	Villebramar	FR	NMB-no number	*Plagiolophus* sp.	tooth frg.	P - Pachynolophidae	MP22	31.7	24.0	0.2					-9.9	0.0						-1.4	29.5	0.1	4.5
17	Villebramar	FR	NMB-no number	*Plagiolophus* sp.	tooth frg.	P - Pachynolophidae	MP22	31.7	23.3	0.2					-9.8	0.1						-1.4	29.4	0.1	3.8
17	Villebramar	FR	NMB-no number	*Plagiolophus* sp.	tooth frg.	P - Pachynolophidae	MP22	31.7	21.4	0.2	20.5	2.0	14	1.1	-11.0	0.0	-10.5	0.7	14	0.4	-24.2	-3.4	27.4	0.0	4.6
18	Kleinblauen	CH	NMB-KB144a	*Ronzotherium* sp.	tooth frg.	P - Rhinocerotidae	MP22	32	21.2	0.3	21.2	0.3	1	0.6	-10.6	0.0	-10.6	0.1	1	0.2	-24.3	-3.4	27.4	0.0	5.7
15	Möhren13	GE	BSPG-1972XI2186	*Epiaceratherium magnum*	left M3	P - Rhinocerotidae	MP22	31.7	18.1	0.1															
15	Möhren13	GE	BSPG-1972XI2186	*Epiaceratherium magnum*	left M3	P - Rhinocerotidae	MP22	31.7	19.7	0.1					-11.7	0.0						-4.1	26.7	0.1	3.4
15	Möhren13	GE	BSPG-1972XI2197	*Epiaceratherium sp.*	left M2	P - Rhinocerotidae	MP22	31.7	17.8	0.2					-12.3	0.1						-5.6	25.1	0.1	2.4
15	Möhren13	GE	BSPG-1972XI2107	*Epiaceratherium magnum*	left m3	P - Rhinocerotidae	MP22	31.7	18.0	0.2					-12.0	0.1						-6.2	24.6	0.1	3.2
15	Möhren13	GE	BSPG-1972XI2230	*Epiaceratherium magnum*	left m3	P - Rhinocerotidae	MP22	31.7	18.7	0.2					-12.1	0.1						-4.8	26.0	0.1	3.3
15	Möhren13	GE	BSPG-1972XI1451	*Elomeryx crispus crispus*	M3?	A - Anthracotheriidae	MP22	31.7	17.5	0.3															
15	Möhren13	GE	BSPG-1712BC 6.4.76	*Elomeryx crispus crispus*	M	A - Anthracotheriidae	MP22	31.7	16.4	0.3															
15	Möhren13	GE	BSPG-no number	*Elomeryx crispus crispus*	M frg.	A - Anthracotheriidae	MP22	31.7	15.7	0.1					-11.1	0.1						-7.0	23.7	0.1	4.9
15	Möhren13	GE	BSPG-no number	*Elomeryx crispus crispus*	M frg.	A - Anthracotheriidae	MP22	31.7	16.4	0.1					-11.7	0.1						-7.0	23.7	0.1	4.7
15	Möhren13	GE	BSPG-no number	*Elomeryx crispus crispus*	M frg.	A - Anthracotheriidae	MP22	31.7	17.2	0.0					-11.0	0.0						-6.4	24.3	0.1	5.2
15	Möhren13	GE	BSPG-M89 4D 220	*Elomeryx crispus crispus*	m	A - Anthracotheriidae	MP22	31.7	15.8	0.1					-10.7	0.0						-7.1	23.6	0.1	4.3
15	Möhren13	GE	BSPG-no number	*Anthracotherium monsvialense*	M3?	A - Anthracotheriidae	MP22	31.7	18.3	0.2					-11.3	0.1						-5.7	25.0	0.1	3.0
15	Möhren13	GE	BSPG-no number	*Anthracotherium monsvialense*	M	A - Anthracotheriidae	MP22	31.7	18.9	0.0					-11.4	0.1						-4.9	25.8	0.0	5.1
15	Möhren13	GE	BSPG-no number	*Anthracotherium monsvialense*	enamel frg.	A - Anthracotheriidae	MP22	31.7	19.7	0.2					-12.5	0.1						-4.8	25.9	0.1	4.5
15	Möhren13	GE	BSPG-1972XI2277	*Epiaceratherium magnum*	right P3	P - Rhinocerotidae	MP22	31.7	18.3	0.2	17.8	1.3	15	0.6	-11.2	0.0	-11.6	0.5	12	0.3	-25.3	-5.7	25.0	0.1	4.5

ABLE DR2

Map-Nr.	Locality		Collection & Nr.	Taxon	Sampled material	Family	MAMMAL LEVEL	Age (Ma)	PHOSPHATE $\delta^{18}O$-PO4 SMOW	std.*	AV.	STD.**	N	1.96×SE	CARBONATE IN PHOSPHATE $\delta^{13}C$	std.	AV.	STD.	N	1.96×SE	$\delta^{13}C_{diet}$	$\delta^{18}O$-CO3 VPDB	$\delta^{18}O$-CO3 VSMOW	std.	CO3 wt.%
19	Budapest - Bohn clay pit	HU	MTM-V.83.40	*Ronzotherium velaunum*	m1/2	P - Rhinocerotidae	MP23+	30.2	17.1	0.1	17.1	0.3	1	0.6	-11.1	0.1	-11.1	0.1	1	0.2	-24.8	-7.0	23.6	0.1	5.5
19	Budapest - Ujlak	HU	MTM-V.60.308	? *Eggysodon* sp.	right p3?	P - Hyracodontidae	MP23-24	30	16.2	0.2	16.2	0.3	1	0.6	-13.6	0.1	-13.6	0.1	1	0.2	-27.3	-8.3	22.4	0.0	3.3
16	Cluj	RO	UBB-no number	*Elomeryx borbonicus*	P?	A - Anthracotheriidae	MP23-24	30	16.9	0.1															
16	Cluj	RO	UBB-no number	*Elomeryx borbonicus*	I	A - Anthracotheriidae	MP23-24	30	16.8	0.1	16.9	0.1	2	0.1											
20	Aghires	RO	UBB-no number	? *Anthracotherium monsivalense*		A - Anthracotheriidae	MP23-24	30	15.2	0.1	15.2	0.3	1	0.6											
								30			16.3	1.0	3	1.1											
21	Csákberény	HU	MTM-V.60.284	*Protaceratherium albigense*	right M2 frg.	P - Rhinocerotidae	MP23-25	29.4	16.0	0.0					-13.3	0.1						-6.9	23.8	0.1	5.9
21	Csákberény	HU	MTM-V.60.289	*Protaceratherium albigense*	right M2 frg.	P - Rhinocerotidae	MP23-25	29.4	16.6	0.2	16.3	0.4	2	0.6	-12.8	0.1	-13.1	0.3	2	0.5	-26.8	-7.0	23.7	0.1	3.2
22	Poillat	CH	MJSN-POI007-346	*Ronzotherium*	tooth frg.	P - Rhinocerotidae	MP24-	29.6	17.6	0.3					-9.2	0.1						-4.8	26.0	0.1	
22	Poillat	CH	MJSN-POI007-236	*Ronzotherium*	tooth frg.	P - Rhinocerotidae	MP24-	29.6	19.9	0.3					-10.0	0.1						-4.2	26.5	0.1	
22	Poillat	CH	MJSN-POI007-188	*Ronzotherium*	tooth frg.	P - Rhinocerotidae	MP24-	29.6	18.7	0.3					-10.3	0.1						-3.1	27.7	0.1	
22	Poillat	CH	MJSN-POI007-211	*Ronzotherium*	tooth frg.	P - Rhinocerotidae	MP24-	29.6	16.8	0.3	18.3	1.3	4	1.3	-10.0	0.1	-9.9	0.5	4	0.5	-23.6	-6.6	24.1	0.1	
23	Tatabánya - Felsőgalla	HU	MTM-V.60.154	? *Ronzotherium* cf. *romani* *	left P2	P - Rhinocerotidae	?MP24-25	28.6	14.6	0.2					-12.0	0.1						-8.2	22.4	0.2	3.9
23	Tatabánya - Felsőgalla	HU	MTM-V.60.192	*Ronzotherium* cf. *romani**	left m2/3	P - Rhinocerotidae	MP24-25	28.6	14.9	0.1					-12.3	0.1						-8.1	22.5	0.1	4.7
23	Tatabánya - Felsőgalla	HU	MTM-V.60.590	? *Anthracotherium monsivalense**	M1/2 frg.	A - Anthracotheriidae	MP24-25	28.6	16.0	0.0					-11.3	0.1						-7.6	23.0	0.2	4.6
23	Tatabánya - Felsőgalla	HU	MTM-V.60.1569	? *Anthracotherium monsivalense**	C/c frg.	A - Anthracotheriidae	MP24-25	28.6	15.1	0.1	15.2	0.6	4	0.6	-11.2	0.0	-11.7	0.5	4	0.5	-25.5	-8.3	22.4	0.1	*9.3*
24	Bumbach	CH	NMB-UM7155	*Anthracotherium bumbachense*	i	A - Anthracotheriidae	MP25-	28	16.1	0.2					-10.0	0.0						-8.4	22.2	0.1	3.2
24	Bumbach	CH	NMB-UM13	*Ronzotherium* sp.	p	P - Rhinocerotidae	MP25-	28	15.6	0.4					-11.3	0.1						-8.2	22.5	0.1	4.2
24	Bumbach	CH	NMB-UM6279	*Ronzotherium* sp.	p	P - Rhinocerotidae	MP25-	28	16.7	0.3	16.1	0.6	3	0.6	-9.9	0.0	-10.4	0.8	3	0.8	-24.2	-7.8	22.8	0.1	3.3

CH - Switzerland
GE - Germany
FR- France
HU - Hungary
IT - Italy
RO - Romania

** DB and LS new classification here (MP levels too)*

P - Perissodactyla, A - Artiodactyla

** standard deviation of triplicate analyses*
***for single sample analyses 0.3 std is used derived from the max. error on standard calibration*

Preparation of the samples and their stable isotope analyses

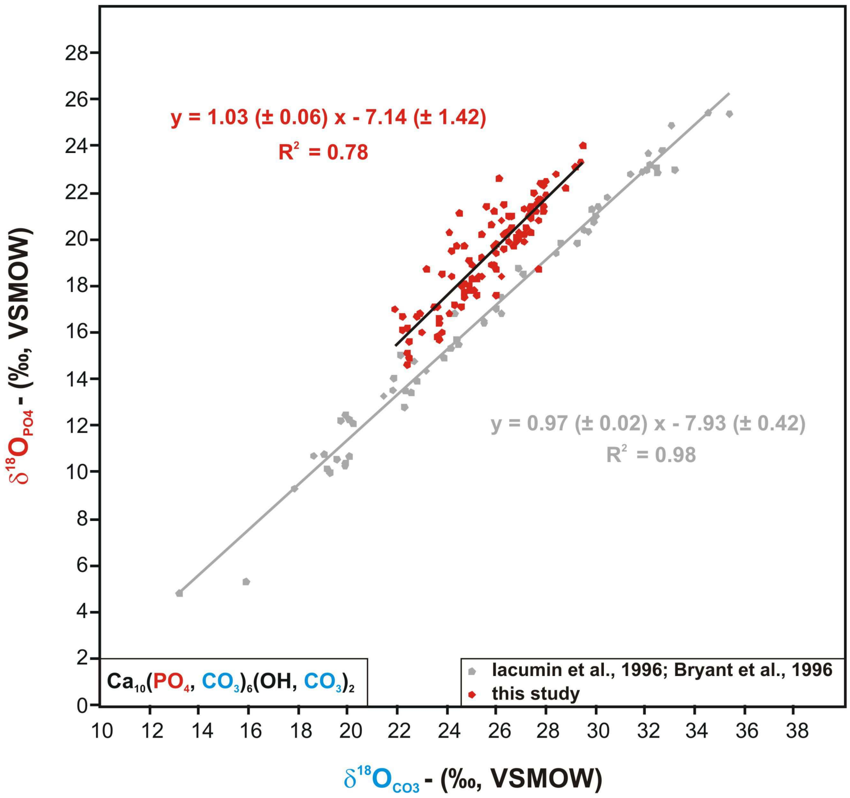
The surface of the teeth was always cleaned before sampling, then tooth enamel was carefully shaven off by a micro-drill, while bigger enamel pieces were powdered and homogenized in an agate mortar. The sample powders were pre-treated in two steps (Koch et al., 1997): 1) leached in 2.5% NaOCl for 24 hours to remove any possible residual organic matter; 2) a wash in 1N acetic acid-Ca-acetate (pH=4.5, 6 hours) to eliminate any exogenous carbonates. Between and after these steps the samples were rinsed several times in distilled water. NBS-120c phosphorite reference material was always prepared parallel with each batch of sample set.

The *oxygen and carbon isotopic compositions of structural carbonate* in phosphate [$\delta^{18}O_{CO3}$, $\delta^{13}C$] were directly analyzed on the pre-cleaned sample powders using a Gasbench II coupled to a Finnigan MAT Delta Plus XL mass spectrometer. The measured isotopic ratios were normalized to an in-house Carrara marble calcite standard that is calibrated against NBS-19. The analytical precision for this method is better than ±0.1‰ for O and C isotopes (e.g., Spötl and Vennemann, 2003). The $\delta^{18}O$ and $\delta^{13}C$ values are expressed in δ-notation relative to VPDB (Vienna Pee Dee Belemnite).

The *phosphate oxygen isotopic composition* [$\delta^{18}O_{PO4}$] The PO_4^{3-} group was further separated from other oxygen bearing ions in the apatite structure (CO_3^{2-}, OH^-), applying a silver phosphate precipitation method (O'Neil et al., 1994; Dettman et al., 2001; Kocsis, 2011). The $\delta^{18}O_{PO4}$ was analyzed on a TC/EA (high-temperature conversion elemental analyzer) (Vennemann et al., 2002) coupled to a Finnigan MAT Delta Plus XL mass spectrometer, where the silver-phosphate is converted to CO at 1450°C via reduction with graphite. The results were corrected to in-house Ag_3PO_4 phosphate standards (LK-2L: 12.1‰ and LK-3L: 17.9‰) that had better than ±0.3‰ (1σ) standards deviations during measurements. These Ag_3PO_4 phosphate standards were calibrated by TC/EA to TU-1 and TU-2 standards using values defined by conventional fluorination method (CF) (cf. Vennemann et al., 2002) and were also calibrated with laser-fluorination method yielding identical values.

For the NBS-120c phosphorite reference material an average values of 21.6 ± 0.3‰ (n=21) was obtained. Oxygen isotope compositions are expressed in the δ-notation relative to Vienna Standard Mean Ocean Water (VSMOW). All the stable isotope analyses were carried out in the stable isotope laboratory of the Institute of Earth Sciences at University of Lausanne, Switzerland.

Figure DR1. Phosphate and structural carbonate oxygen isotopic compositions in bioapatite



The grey dots and grey regression line are derived from datasets of modern mammals (Iacumin et al., 1996; Bryant et al., 1996). Note that the late Eocene-early Oligocene samples show parallel regression line with significant correlation and with similar slope (a) and slightly higher intercept (b) to the modern mammals. Considering the standard errors (SE) on both (a) and (b), the 95% confidential intervals cover the parameters of the modern dataset (a ± 0.11; b ± 2.79). Moreover, assuming that the modern data represent the real correlation between $\delta^{18}O_{CO3}$ and $\delta^{18}O_{PO4}$ of the whole population (statistically speaking from which the fossil sub-samples may have been taken), then a simply Z-test on the SE of the slope and the intercept in the fossil dataset yield no significant differences from the mean of these parameters of the modern population (95% conf. limit, i.e. 1.96×SE). All these suggest that the fossil teeth are well-preserved and no significant diagenetic isotopic alteration occurred in tooth enamel.

Further notes: The $\delta^{18}O_{CO3}$ is chosen as the "independent" variable (x) because these values have much smaller error associated with them concerning their measurements when compared to $\delta^{18}O_{PO4}$ analyses. The apparently more disperse fossil dataset may perhaps link to minor alteration in $\delta^{18}O_{CO3}$, hence the reason for using $\delta^{18}O_{PO4}$ in this work to investigate *in-vivo* environmental factors (see also Kohn and Cerling, 2002; Zazzo et al., 2004 cited in the paper).

Table DR3. t-tests on the major taxa at four localities

Map-Nr.	Locality		Taxon	Family	MAMMAL LEVEL	Age (Ma)	δ^{18}O-PO4 SMOW	std.	δ^{13}C	std.		
				Artiodactyla								
15	**Möhren 19**	GE	*Diplobune* sp.	A - Anoplotheriidae	MP21	33.25	**21.4**	0.1	**-11.1**	0.0	**t(8)= 0.42, p=0.69**	**δ^{18}O**
15	**Möhren 19**	GE	*Diplobune* cf. *quercyi*	A - Anoplotheriidae	MP21	33.25	**18.9**	0.1			**t(7)= 1.02, p=0.34**	**δ^{13}C**
15	**Möhren 19**	GE	*Diplobune* cf. *quercyi*	A - Anoplotheriidae	MP21	33.25	**18.4**	0.1	**-12.2**	0.1		
15	**Möhren 19**	GE	*Diplobune* sp.	A - Anoplotheriidae	MP21	33.25	**20.2**	0.3	**-10.7**	0.0		
15	**Möhren 19**	GE	*Anoplotherium commune*	A - Anoplotheriidae	MP21	33.25	**18.1**	0.1	**-14.1**	0.1		
15	**Möhren 19**	GE	*Anoplotherium commune*	A - Anoplotheriidae	MP21	33.25	**17.1**	0.1	**-13.2**	0.1		
				Perissodactyla								
15	**Möhren 19**	GE	*Palaeotherium medium*	P - Palaeotheriidae	MP21	33.25	**17.8**	0.1	**-12.1**	0.1		
15	**Möhren 19**	GE	*Palaeotherium medium*	P - Palaeotheriidae	MP21	33.25	**17.7**	0.0	**-11.4**	0.1		
15	**Möhren 19**	GE	*Palaeotherium medium*	P - Palaeotheriidae	MP21	33.25	**18.0**	0.1	**-11.9**	0.1		
15	**Möhren 19**	GE	*Palaeotherium medium*	P - Palaeotheriidae	MP21	33.25	**20.9**	0.0	**-10.4**	0.1		
				Artiodactyla							**t(13)= 1.78, p=0.10**	**δ^{18}O**
15	**Möhren13**	GE	*Elomeryx crispus crispus*	A - Anthracotheriidae	MP22	31.7	**17.5**	0.3			**t(10)= 1.54, p=0.16**	**δ^{13}C**
15	**Möhren13**	GE	*Elomeryx crispus crispus*	A - Anthracotheriidae	MP22	31.7	**16.4**	0.3				
15	**Möhren13**	GE	*Elomeryx crispus crispus*	A - Anthracotheriidae	MP22	31.7	**15.7**	0.1	**-11.1**	0.1		
15	**Möhren13**	GE	*Elomeryx crispus crispus*	A - Anthracotheriidae	MP22	31.7	**16.4**	0.1	**-11.7**	0.1		
15	**Möhren13**	GE	*Elomeryx crispus crispus*	A - Anthracotheriidae	MP22	31.7	**17.2**	0.0	**-11.0**	0.0		
15	**Möhren13**	GE	*Elomeryx crispus crispus*	A - Anthracotheriidae	MP22	31.7	**15.8**	0.1	**-10.7**	0.0		
15	**Möhren13**	GE	*Anthracotherium monsvialense*	A - Anthracotheriidae	MP22	31.7	**18.3**	0.2	**-11.3**	0.1		
15	**Möhren13**	GE	*Anthracotherium monsvialense*	A - Anthracotheriidae	MP22	31.7	**18.9**	0.0	**-11.4**	0.1		
15	**Möhren13**	GE	*Anthracotherium monsvialense*	A - Anthracotheriidae	MP22	31.7	**19.7**	0.2	**-12.5**	0.1		
				Perissodactyla								
15	**Möhren13**	GE	*Epiaceratherium magnum*	P - Rhinocerotidae	MP22	31.7	**18.1**	0.1				
15	**Möhren13**	GE	*Epiaceratherium magnum*	P - Rhinocerotidae	MP22	31.7	**19.7**	0.1	**-11.7**	0.0		
15	**Möhren13**	GE	*Epiaceratherium sp.*	P - Rhinocerotidae	MP22	31.7	**17.8**	0.2	**-12.3**	0.1		
15	**Möhren13**	GE	*Epiaceratherium magnum*	P - Rhinocerotidae	MP22	31.7	**18.0**	0.2	**-12.0**	0.1		
15	**Möhren13**	GE	*Epiaceratherium magnum*	P - Rhinocerotidae	MP22	31.7	**18.7**	0.2	**-12.1**	0.1		
15	**Möhren13**	GE	*Epiaceratherium magnum*	P - Rhinocerotidae	MP22	31.7	**18.3**	0.2	**-11.2**	0.0		
				Artiodactyla								
17	**Villebramar**	FR	*Entelodon* sp.	A - Entelodontidae	MP22	31.7	**19.4**	0.2	**-11.2**	0.0	**t(12)= 0.04, p=0.97**	**δ^{18}O**
17	**Villebramar**	FR	*Entelodon* sp.	A - Entelodontidae	MP22	31.7	**18.9**	0.3	**-10.5**	0.1	**t(12)= 0.88, p=0.23**	**δ^{13}C**
17	**Villebramar**	FR	*Entelodon* sp.	A - Entelodontidae	MP22	31.7	**23.1**	0.2	**-10.7**	0.1		
				Perissodactyla								
17	**Villebramar**	FR	*Plagiolophus* sp.	P - Pachynolophidae	MP22	31.7	**21.9**	0.2	**-10.6**	0.1		
17	**Villebramar**	FR	*Plagiolophus* sp.	P - Pachynolophidae	MP22	31.7	**21.5**	0.2	**-10.0**	0.1		
17	**Villebramar**	FR	*Plagiolophus* sp.	P - Pachynolophidae	MP22	31.7	**24.0**	0.2	**-9.9**	0.0		
17	**Villebramar**	FR	*Plagiolophus* sp.	P - Pachynolophidae	MP22	31.7	**23.3**	0.2	**-9.8**	0.1		
17	**Villebramar**	FR	*Plagiolophus* sp.	P - Pachynolophidae	MP22	31.7	**21.4**	0.2	**-11.0**	0.0		
17	**Villebramar**	FR	*Ronzotherium* sp.	P - Rhinocerotidae	MP22	31.7	**18.4**	0.3	**-10.8**	0.1		
17	**Villebramar**	FR	*Ronzotherium* sp.	P - Rhinocerotidae	MP22	31.7	**18.9**	0.0	**-10.5**	0.1		
17	**Villebramar**	FR	*Ronzotherium* sp.	P - Rhinocerotidae	MP22	31.7	**20.1**	0.2	**-11.4**	0.1		
17	**Villebramar**	FR	*Ronzotherium* sp.	P - Rhinocerotidae	MP22	31.7	**18.4**	0.2	**-8.8**	0.1		
17	**Villebramar**	FR	*Ronzotherium* sp.	P - Rhinocerotidae	MP22	31.7	**20.2**	0.2	**-10.4**	0.1		
17	**Villebramar**	FR	*Ronzotherium* sp.	P - Rhinocerotidae	MP22	31.7	**17.6**	0.1	**-11.2**	0.1		
				Artiodactyla							**t(14)= 1.45, p=0.17**	**δ^{18}O**
13	**Monteviale**	IT	*Anthracotherium monsvialense*	A - Anthracotheriidae	MP21-	33.4	**20.0**	0.1	**-9.8**	0.1	**t(10)= 2.01, p=0.07**	**δ^{13}C**
13	**Monteviale**	IT	*Anthracotherium monsvialense*	A - Anthracotheriidae	MP21-	33.4	**20.8**	0.2	**-8.5**	0.1		
13	**Monteviale**	IT	*Anthracotherium monsvialense*	A - Anthracotheriidae	MP21-	33.4	**21.7**	0.1	**-8.3**	0.1		
13	**Monteviale**	IT	*Anthracotherium monsvialense*	A - Anthracotheriidae	MP21-	33.4	**21.2**	0.1				
13	**Monteviale**	IT	*Anthracotherium monsvialense*	A - Anthracotheriidae	MP21-	33.4	**22.2**	0.1	**-7.7**	0.0		
13	**Monteviale**	IT	*Anthracotherium monsvialense*	A - Anthracotheriidae	MP21-	33.4	**20.2**	0.1	**-9.3**	0.1		
13	**Monteviale**	IT	*Anthracotherium monsvialense*	A - Anthracotheriidae	MP21-	33.4	**20.3**	0.3	**-8.2**	0.0		
13	**Monteviale**	IT	*Anthracochoerus stehlini*	A - Anthracotheriidae	MP21-	33.4	**20.0**	0.2				
13	**Monteviale**	IT	*Anthracochoerus stehlini*	A - Anthracotheriidae	MP21-	33.4	**20.1**	0.1				
13	**Monteviale**	IT	*Anthracochoerus stehlini*	A - Anthracotheriidae	MP21-	33.4	**20.7**	0.3				
				Perissodactyla								
13	**Monteviale**	IT	*Epiaceratherium bolcense* (*Trigonias ombonii*)	P - Rhinocerotidae	MP21-	33.4	**21.0**	0.2	**-9.0**	0.0		
13	**Monteviale**	IT	*Epiaceratherium bolcense* (*Trigonias ombonii*)	P - Rhinocerotidae	MP21-	33.4	**20.5**	0.0	**-9.1**	0.1		
13	**Monteviale**	IT	*Epiaceratherium bolcense* (*Trigonias ombonii*)	P - Rhinocerotidae	MP21-	33.4	**21.2**	0.2	**-8.9**	0.1		
13	**Monteviale**	IT	*Epiaceratherium bolcense* (*Trigonias ombonii*)	P - Rhinocerotidae	MP21-	33.4	**20.3**	0.2	**-9.8**	0.1		
13	**Monteviale**	IT	*Epiaceratherium bolcense* (*Trigonias ombonii*)	P - Rhinocerotidae	MP21-	33.4	**22.4**	0.2	**-9.5**	0.1		
13	**Monteviale**	IT	*Epiaceratherium bolcense* (*Trigonias ombonii*)	P - Rhinocerotidae	MP21-	33.4	**22.8**	0.3	**-9.8**	0.1		

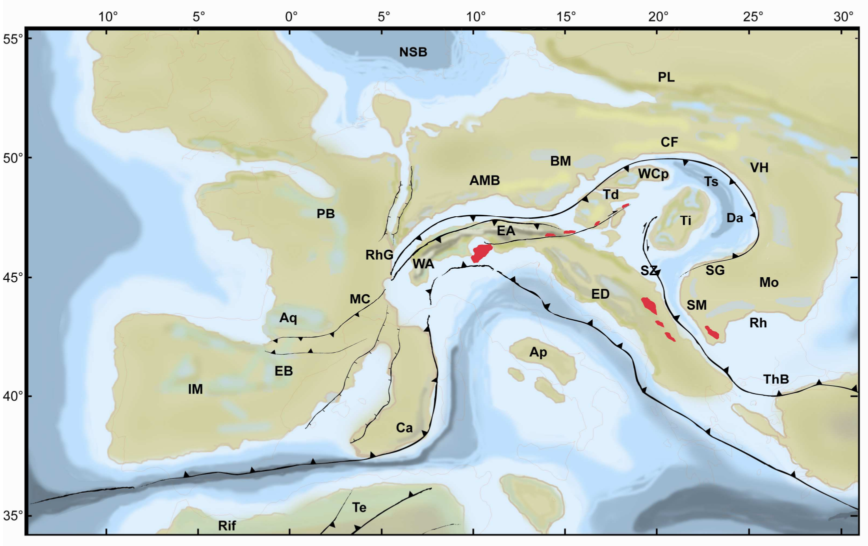
Figure DR2. Detailed paleogeographic maps (from Figure 3)

The paleomaps are based on compilation of data from many different works. See reference list for details.

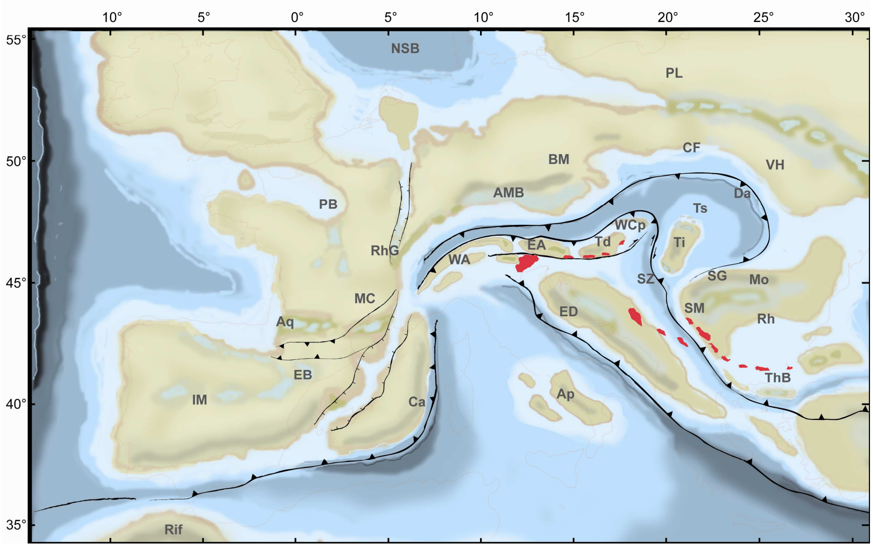
Abbreviations on the maps:

AMB – Alpine Molasse Basin, **Ap** – Apulia, **Aq** – Aquitanian basin, **BM** – Bohemian Massif, **Ca –** Calabria, **CF –** Carpathian Foreland, **Da –** Dacides, **EA –** Estern Alps, **EB –** Ebro Basin, **ED –** External Dinarides, **IM** – Iberian Massif, **MC** – Massif Central, **Mo** – Moesian, **NSB –** North Sea Basin, **PB** – Paris Basin, **PL** – Polish Lowlands, **Rh** – Rhodopes, **Rh**G – Rhine Graben, **SA** – Southern Alps, **SG** – Supra Getic, **SM** – Serbo-Macedonian Massif, **SZ** – Sava Zone, **Td** - Transdanubian, **ThB –** Thrace Basin, **Ti –** Tisza unit, **Ts –** Transylvanian Paleogene Basin, **VH –** Volhynian High, **WA –** Western Alps, **WCp –** Western Carpathians.

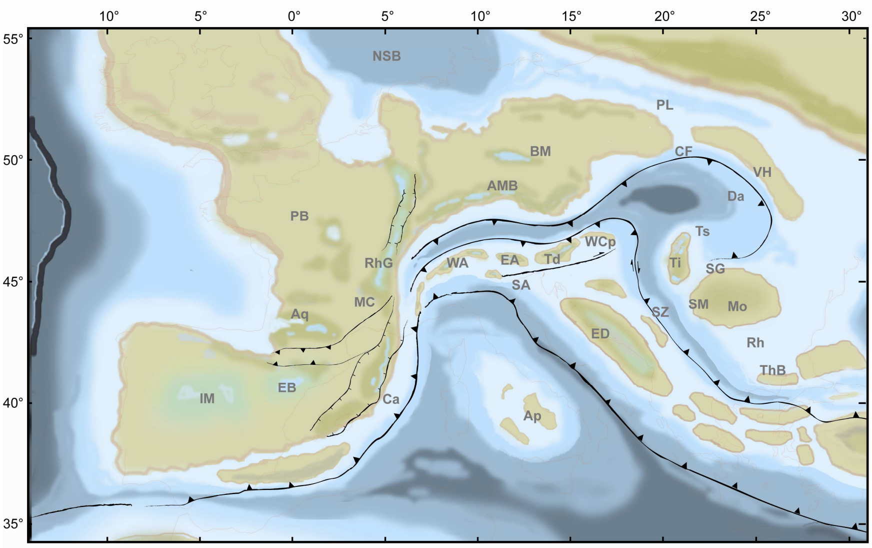
LATE RUPELIAN



PRIABONIAN - RUPELIAN



BARTONIAN - PRIABONIAN



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